BEST AVAILABLE COPY

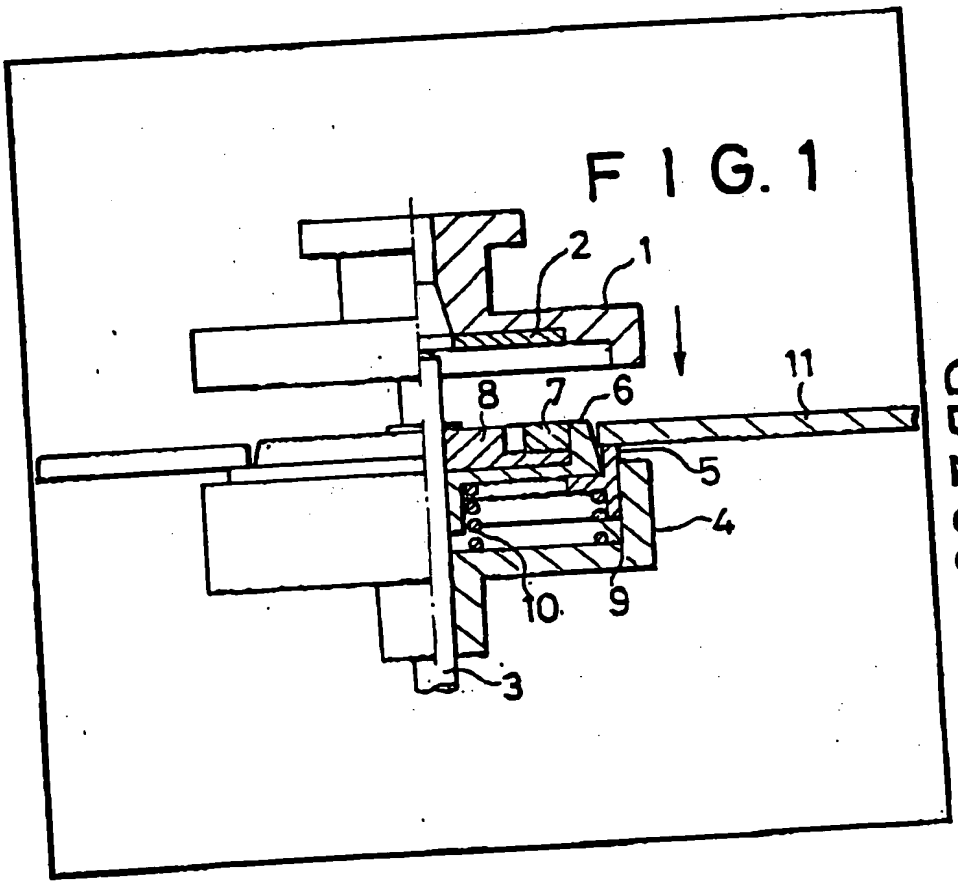
(12) UK Patent Application (19) GB (11) 2 056 747 A

(21) Application No 8027633
(22) Date of filing
29 Jun 1979
Date lodged
26 Aug 1980
(30) Priority data
(31) 53/092501U
53/152988U
(32) 5 Jul 1978
7 Nov 1978
(33) Japan (JP)
(43) Application published
18 Mar 1981
(51) INT CL³ G11B 25/04
23/00
(52) Domestic classification
G5R B25 B361 B36Y
B443 B789 B885
F2U 204 208 360 392
(56) Documents cited
None
(58) Field of search
G5R
(60) Derived from Application
No 7922653 under
Section 15(4) of the
Patents Act 1977

(71) Applicant
Universal Pioneer
Corporation
No 4-1 Meguro
1-chome
Meguro-ku
Tokyo
Japan
(72) Inventors
Hitoshi Kanamaru
Fumio Kadoo
(74) Agents
Marks & Clerk
Alpha Tower
ATV Centre
Birmingham
B1 1TT

(54) Disc record clamping device

(57) A disc (11) is placed on a spring biassed support ring 5 and a retaining clamp 1 is placed on the disc 11 to press it and the support ring downwards until the disc engages the turntable 4. The clamp is retained in this position by a magnet (7). During the movement downwards a frustoconical member (6) which is co-axial with the rotation axis engages a central hole in the disc and thereby centres the disc with respect to the rotation axis. (the member 6 also being movable parallel to the rotation axis to enable subsequent engagement of the disc with the turntable).



GB 2 056 747 A

BEST AVAILABLE COPY

2056747

FIG. 1

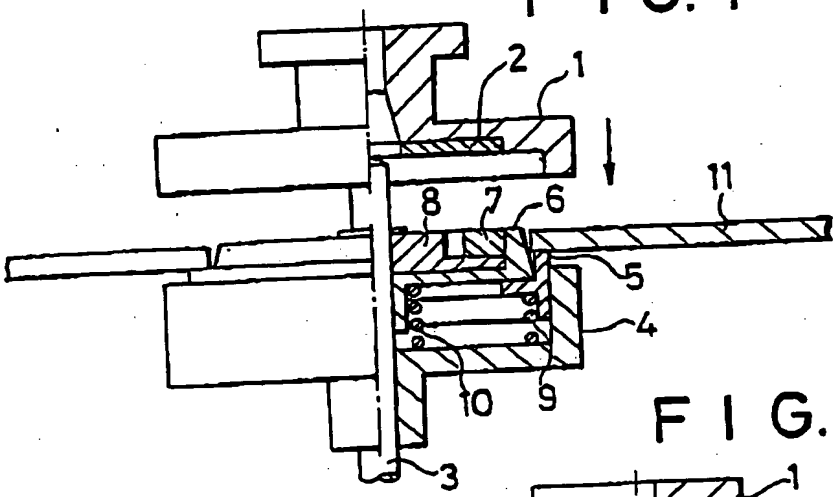


FIG. 2

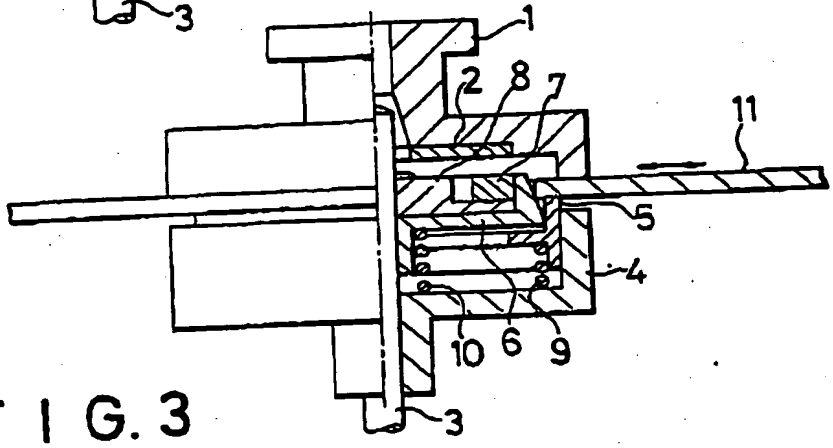
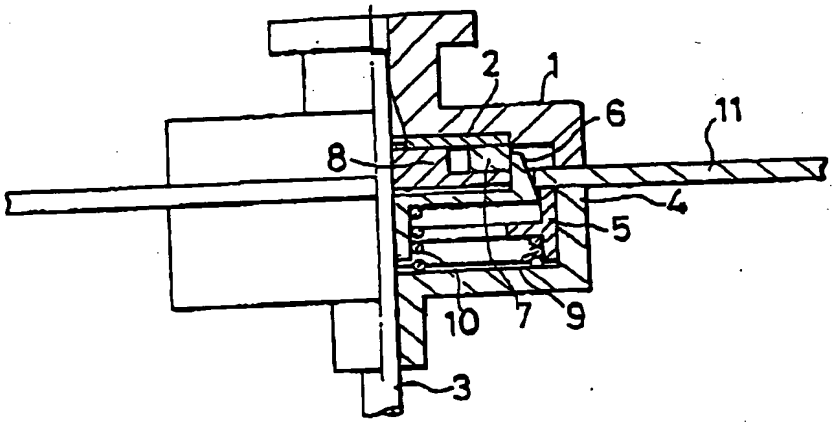


FIG. 3



SPECIFICATION

Disc clamping device

This invention relates to a device for clamping a disc, such as a video disc.

In order that an information carrier such as a video disc is satisfactorily clamped to a reproducing device, the following conditions must be satisfied:–

(1) the disc must be perpendicular to the axis about which it is rotated;

(2) the centre of the disc must lie on the rotation axis;

(3) the static height of the disc on the reproducing device must remain unchanged; and

(4) the disc must be held strongly on the reproducing device.

If these conditions are not met, then it becomes difficult to maintain constant the distance between the disc and an optical reading device (such as a lens) or the like and to follow correctly a recorded track on the disc. In the worst case, the disc may even come off the turntable on which it is mounted during operation.

It is an object of the present invention to provide a disc clamping device which can satisfy the above-described conditions.

According to the present invention, there is provided a disc clamping device comprising a rotatable turntable, a support member movable relative to the turntable in a direction parallel to the rotation axis thereof and arranged to support the disc initially in axially spaced relation to the turntable, a retaining member engageable with the disc so as to move the latter and the support member axially of the turntable and thereby press the disc into engagement with the turntable, and a centering member arranged to engage the disc before the latter engages the turntable and, by such engagement, to centre the disc with respect to the turntable rotation axis, the centering member being movable in a direction parallel to the turntable rotation axis to enable subsequent engagement of the disc with the turntable.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:–

Figure 1 is a sectional side view of a disc clamping device according to the present invention, showing the device prior to a disc clamping operation; and

Figures 2 and 3 are similar views to Fig. 1 showing the device respectively during and at the completion of the disc clamp operation.

Referring to the drawings, the disc clamping device shown therein forms part of a reproducing device and comprises a retaining or clamping member 1 which has a plate 2 secured to its underside. A spindle 3 is rotatable by means of an electric motor (not shown) and has a turntable 4 fixedly mounted thereon. A support ring 5 engages an internal wall of the turntable 4 so as to be slidable relative thereto in a direction parallel to the spindle rotation axis. A centering member 6 is disposed within the support ring 5 and is slidably mounted on the spindle 3 for movement parallel to the rotation axis thereof. The centering member 6 has a frustoconical outer surface which is co-axial with said rotation axis. A magnet 7 is supported by a yoke 8 for rotation with the spindle 3, the yoke being fixed to the spindle (as shown) or secured to the centering member 6. Springs 9 and 10 respectively bias the support ring 5 and the centering member 6 away from the turntable 4.

When it is desired to mount a disc 11 on the reproducing device, the disc is initially rested on the support member 5 in the manner illustrated in Fig. 1. At this time the disc 11 is not in substantial contact with the centering member 6 and is held by the support member 5 in axially spaced relation to the turntable 4 and parallel to a supporting surface of the latter. The retaining member 1 is then placed over the spindle 3 and is engaged with the disc 11 so as to move both the disc and the support member 5 downwardly against the action of the spring 9. After a certain amount of movement, a central hole in the disc comes into contact with the frusto-conical external surface of the centering member 6, as shown in Fig. 2. Since the member 6 is fixed against movement radially of the spindle 3, any eccentricity of the disc 11 with respect to the spindle rotation axis is corrected by radial movement of the disc itself. At this time the disc is held in a horizontal position (i.e. in a plane perpendicular to the spindle rotation axis) by the support ring 5. The surfaces of the retaining member 1, the support ring 5 and the centering member 6 which contact the disc 11 are, for example, finely finished (machined) to minimize their coefficients of friction so as to facilitate sliding movement of the disc. In this way the disc is accurately centered with respect to the spindle rotation axis.

As the retaining member 1 is moved further downwardly, the disc 11 is moved downwardly in a horizontal state with its centre coinciding with the spindle rotation axis until it is brought into contact with the supporting surface of the turntable 4. The magnet 7, the yoke 8 and the plate 2 then form a magnetic circuit in which magnetic flux is extended to clamp the disc strongly between the retaining member 1 and the turntable 4, as shown in Fig. 3. The supporting surface of the turntable may be coated with rubber, TEFLON (Registered Trade Mark) or the like or may be coarsely finished to increase the coefficient of friction thereof and thereby prevent the disc

BEST AVAILABLE COPY

11 from slipping on the turntable.

As is apparent from the above description, the disc 11 is first held horizontal (i.e. in a plane perpendicular to the spindle rotation axis) by the support ring 5, and is then brought into contact with the centering member 6. The disc will thus never be brought into contact with the member 6 while in an inclined state, and therefore the centre of the disc will always be made to coincide with the spindle rotation axis. Furthermore, the outer surface of the support ring 5 is in contact with the internal wall of the turntable 4, and therefore the support ring 5 can be moved vertically (i.e. parallel to the spindle rotation axis) whilst remaining horizontal.

Since the centering member 6 slides along the outer surface of the spindle 3, its frusto-conical external surface will be held co-axial with the spindle rotation axis. Once mounted on the reproducing device, the disc 11 is held in contact with the turntable 4 which is itself fixed to the spindle 3: accordingly, the static height of the disc 11 on the reproducing device is maintained constant, and the height of a reading device (such as a lens) can be set irrespective of fluctuations in the clamping state.

The disc 11 can be correctly clamped by varying the co-efficients of friction of the surfaces of the components which are brought into contact with the disc. Moreover, the clamping force is provided by a magnetic circuit formed by the magnet 7, the yoke 8 and the plate 2. Therefore, the clamping force is several times stronger than that obtained where no magnetic circuit is formed, and accordingly a small magnet can be utilized in a narrow space.

The above-described disc clamping device also forms the subject of our co-pending U.K. Patent Application No. 7922653 of even date.

CLAIMS

1. A disc clamping device comprising a rotatable turntable, a support member movable relative to the turntable in a direction parallel to the rotation axis thereof and arranged to support the disc initially in axially spaced relation to the turntable, a retaining member engageable with the disc so as to move the latter and the support member axially of the turntable and thereby press the disc into engagement with the turntable, and a centering member arranged to engage the disc before the latter engages the turntable and, by such engagement, to centre the disc with respect to the turntable rotation axis, the centering member being movable in a direction parallel to the turntable rotation axis to enable subsequent engagement of the disc with the turntable.

2. A disc clamping device as claimed in claim 1, further comprising magnetic means arranged to hold the retaining member magnetically in a position in which it presses the disc into engagement with the turntable, so that the disc is thereby clamped betwen the retaining member and the turntable.

3. A disc clamping device as claimed in claim 2, wherein the magnetic means includes a magnet supported by a yoke which is rotatable with the turntable.

4. A disc clamping device as claimed in claim 3, wherein the retaining member has secured thereto a plate which forms a magnetic circuit with the magnet and the yoke when the retaining member is in said position in which it presses the disc into engagement with the turntable.

5. A disc clamping device as claimed in claim 3 or 4, wherein the yoke is secured to the centering member.

6. A disc clamping device as claimed in claim 3, 4 or 5, wherein the yoke is biassed in a direction towards the retaining member.

7. A disc clamping device as claimed in any preceding claim, wherein the support plate is biassed in the opposite direction to that in which it moves to enable engagement of the disc with the turntable.

8. A disc clamping device as claimed in any preceding claim, wherein the centering member has a frusto-conical external surface which is co-axial with the turntable rotation axis and which is arranged to engage a central hole in the disc.

9. A disc clamping device as claimed in claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by Burgess & Son (Abingdon) Ltd.—1981.
Published at The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

BEST AVAILABLE COPY